Arbuscular mycorrhizal colonization in black poplar roots after defoliation by an invasive and a native insect

UNIVERSITÀ DEGLI STUDI DI TORINO

Contributo #c10/222

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Riassunto: More than 90% of terrestrial plants form root interactions with mycorrhizal fungi that provide mineral nutrients in exchange for carbon compounds. In particular, arbuscular mycorrhizal (AM) symbiosis involves Glomeromycota fungi and the majority of plants, including forest tree species such as poplars (*Populus* spp.). Plants can interact with defoliators that might affect carbon availability, thus influencing mycorrhizal symbiosis. The increasing threat of invasive species, among which are several defoliators, raises a question about their possible impact on the components of native ecosystems. This work compares the effect of two Lepidoptera defoliators, one invasive (*Hyphantria cunea*) and one native (*Limantria dispar*) on poplar colonization by an AM fungus (*Funneliformis mosseae*). In detail, we evaluated the effect of both partial and total defoliation by larvae of the two species i) on the colonization of black poplar plants (*P. nigra* Jean Pourtet) by *F. mosseae* and ii) on the expression of fungal genes playing a role during symbiosis: an amino acid permease (*GmosAAP1*); a phosphate transporter (*GmosPT*) and two different H-ATPases (*GmHA5, GmPMA1*). Both control and defoliated poplars showed a low level of mycorrhization, as already shown by previous works, and no significant differences have been found among the five considered treatments (control plants; partial and total defoliation by *H. cunea*; partial and total defoliation by L. dispar). Concerning gene expression in the mycorrhizae, *GmosPT* and*GmHA5* were not differently expressed in control and defoliated plants ($p>0.05$). *GmosAAP1*, previously reported as expressed in the extra-radical mycelium, was detected in RT-PCR, although it was not possible to quantify its transcripts in quantitative PCR (qPCR). This may suggest the presence of a little amount of extra-radical mycelium in poplar roots.
Similarly, *GmPMA1* transcripts were detected in one replicate of the defoliated samples using RT-PCR, but not in qPCR. These results show that neither the invasive nor the native insect do not affect the AM colonization, at least after of the interval of considered time. We cannot exclude that a longer time after defoliation may be needed to affect fungal colonization. In addition, an analysis of further fungal genes (*e.g.,* hexose transporter) could be useful to obtain a more complete picture, but, unfortunately, *F. mosseae* genome has not been sequenced and available sequences are still limited

Parole chiave: Arbuscular mycorrhizal symbiosis, Invasive insect species, Gene expression, Poplar

Citazione: Balestrini R, Zampieri E, Petrucco Toffolo E, Mello A, Faccoli M, Giorcelli A, Gonthier P (2015). Arbuscular mycorrhizal colonization in black poplar roots after defoliation by an invasive and a native

insect. In: Proceedings of the 10th SISEF National Congress “Sostenere il pianeta, boschi per la vita - Ricerca e innovazione per la tutela e la valorizzazione delle risorse forestali” (Travaglini D, Rossi P, Bucci G eds). Firenze (Italy) 15-18 Sep 2015. Abstract-book, Paper #c10.5.8. [online] URL: http://www.sisef.it/sisef/x-congresso/

Collocazione

c10.5.8

Sessione

Sessione Parallela 03

Data

Mercoledi 16 Settembre 2015

Ora

09:00-11:00

Luogo

Aula 15-004

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